

On Farm Trial on Evaluation of Cost-Effective Weed Control Measures in Rapeseed-Mustard under Teesta Flood Plains of Bengal

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Abstract

Rapeseed-mustard is a major oilseed crop in Cooch Behar district of West Bengal; however, the productivity of the crop (843 kg/ha) is poor compared to other districts of Bengal. One of the major reasons for this poor productivity is high weed pressure coupled with late sowing and particularly in the northern part of Bengal weed problem is severe due to high rainfall leading to high seed bank potential. Keeping these in mind, an on farm trial on evaluation of cost-effective and eco-friendly weed control measures in rapeseed-mustard were carried out for two consecutive years, *rabi* of 2006-07 and 2007-08, at three villages of Cooch Behar district. The experiment was laid out in randomised block design with eight replicates. In the experimental fields, major weeds were *Stellaria media*, *Polygonum pensylvanicum*, *Polygonum orientale*, *Polygonum persicaria*, *Vicia sativa*, *Cynodon dactylon*, of which *Stellaria* was supposed to be the primary one. It was revealed that pendimethalin at 0.30 kg a.i. / ha was found to be more effective as compared to fluchloralin at 0.70 kg a.i./ ha as reflected by weed dry matter production and yield. Maximum yield (11.3q/ha) was achieved with the application of pendimethalin at 0.30 kg a.i./ha as pre-emergence spray followed by one hand weeding at 35 DAS. The highest gross return (Rs 19,210.00/ha), net income (Rs 8,840.00/ha) and benefit-cost ratio (1.85) were also obtained with application of pendimethalin at 0.30 kg a.i. /ha along with one hand weeding at 35 DAS.

Key words : Rapeseed-Mustard, Pendimethalin, Fluchloralin.

In Indian economy rapeseed-mustard has a crucial role as it is a major oilseed crop in terms of rich source of edible oil content. It is a major oilseed crop in the state of West Bengal; however, the productivity of the crop is still far behind the leading oil producing states of the country. In Coochbehar district, the average productivity of mustard is only 843 kg/ha although around thirty five thousand hectares of land is under the crop. One of the major reasons for this poor productivity is high weed pressure coupled with late sowing and particularly in the northern part of Bengal weed problem is severe due to high rainfall leading to high seed bank potential. As farmers are going towards hand-weeding twice for effective weed control, it increases the cost of cultivation to huge extent. Use of some herbicides like pendimethalin and fluchloralin can control the weeds effectively; however, phytotoxicity of pendimethalin in higher doses is a big problem in terai soils.

Methods

Participatory research needs to be strengthened

for effective technology delivery and on farm trials are one of the means to assure farmers' participation in a location specific technology development (1). On farm trial on evaluation of cost-effective and eco-friendly weed control measures in rapeseed-mustard under terai region were carried out during two consecutive years, *rabi* of 2006-07 and 2007-08, at three villages of Cooch Behar district, viz., Khagrbari (Cooch Behar-II), Moamari (Cooch-Behar-I) and Barashakdal (Dinhata-II). Before implementing OFT, the problems responsible for poor productivity of mustard in the region were identified through participatory approaches and the major problems, as identified by the villagers were supposed to be the high weed pressure triggered by late sowing.

In each year three innovative and receptive farmers from each of the villages were selected for conducting the trial to ensure their active participation. The selected farmers were imparted training on the aspect of integrated crop management for rapeseed-mustard. Farmers' perspective, farmers' participation, farmers' management status and suitability of site—these four basic considerations were included in the

Table 1. Yield of rapeseed-mustard as influenced by weed dry matter.

Treatments	Weed dry matter (g/sq. m)		Number of siliqua plant	Yield (q/ha)
	60 DAS	90 DAS		
T ₁ (Two Hand weeding one at 15 DAS and another at 35 DAS)	70.8	58.5	70.1	10.1
T ₂ (Pendimethalin at 0.30 kg a.i./ha as pre-emergence +Hand weeding at 35 DAS)	74.6	138.7	73.9	11.3
T ₃ (Fluchloralin at 0.70 kg a.i./ha +Hand weeding at 35 DAS)	79.5	149.2	69.2	10.8
CD at 5%	NS	3.5	NS	NS

trial (2).

The experimental soil was sandy loam in texture with pH ranging between 5.7—6.4 with available nitrogen 170—241 kg/ha, available phosphorus 32—69 kg/ha and available potassium 92—153 kg/ha.

The experiment was laid out in randomised block design with eight replicates and the treatments were allotted randomly to the experimental fields accordingly. Under the OFT, the treatments were as follows: T₁—Two hand weeding, one at 15 DAS and another at 35 DAS (Farmers' practice), T₂—Pendimethalin at 0.30 kg a.i./ha as pre-emergence + one hand weeding at 35 DAS, and T₃—Fluchloralin at 0.70 kg a.i./ha + one hand weeding at 35 DAS.

In both the years the crop (rapeseed-mustard cv NC-1) was sown during first fortnight of November. Recommended package of practices other than weed control measures were adopted for successful growth of the crop. The herbicides were applied as pre emergence spray with high volume sprayer (550 liter/ha).

Sarkar and Mukherjee (3) emphasized the application of pendimethalin and fluchloralin keeping in mind the problem of phyto-toxicity at higher doses. For determining the weed dry matter production, weed samples were taken from each plot during 60 and 90 DAS with the use of quadrant having specification 0.5 m × 0.5 m. Yield attributes and yield data were

Table 2. Production economics of the crop under OFT.

Treatments	Total cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net income (Rs/ha)	Benefit cost ratio
T ₁ (Two Hand weeding, one at 15 DAS and another at 35 DAS)	11,800.00	18,020.00	6,220.00	1.52
T ₂ (Pedimethalin at 0.3 kg a.i./ha as pre-emergence +Hand weeding at 35 DAS)	10,370.00	19,210.00	8,840.00	1.85
T ₃ (Fluchloralin at 0.7 kg a.i./ha + Hand weeding at 35 DAS)	10,600.00	18,360.00	7,760.00	1.73

collected during harvest and their feasibility and economic viability were assessed accordingly.

Results and Discussion

In the experimental fields, major weeds were *Stellaria media*, *Polygonum pensylvanicum*, *Polygonum orientale*, *Polygonum persicaria*, *Vicia sativa*, *Cynodon dactylon*, however the maximum infestation was found with *Stellaria media* (known as *kankri* in local language) which formed a thick mat over the field within a short period. Among the herbicides, pendimethalin at 0.30 kg a.i./ha was found to be more effective as compared to fluchloralin at 0.70 kg a.i./ha as indicated by weed dry matter production. At 60 DAS, no significant difference in weed dry matter was observed between hand weeding and any of the herbicides (Table 1). However, weed control efficiency of pendimethalin was higher than fluchloralin throughout the entire crop growth period. During harvest weed dry matter was recorded to be maximum in plots where two hand-weeding were performed. Actually hand-weeding employed at 15 and 35 DAS failed to minimize the growth of weeds due to rapid emergence and establishment of *Polygonum* at the later growth stages and in farmers field it was not truly a weed free check. Herbicides

were found to be effective during the initial part of growth; rapid emergence of *Polygonum* was also taken place even in herbicides treated plots. These are in conformity with the findings of Sarkar et al. (4).

Pendimethalin at 0.30 kg a.i./ha showed highest number of siliqua/plant (73.2) followed by fluchloralin at 0.70 kg a.i./ha. The number of siliqua did not vary significantly under various treatments. The trend was similar in case of seed yield also. Maximum yield (11.3 q/ha) was achieved with application of pendimethalin at 0.30 kg a.i./ha as pre-emergence spray, although the yield increase was not statistically significant as compared to other treatments. The results corroborated with the findings of some workers (3).

Among the weed control treatments, the highest gross return (Rs 19,210.00/ha) and net income (Rs 8,840.00/ha) were obtained under application of pendimethalin at 0.30 kg a.i./ha (Table 2). Similarly benefit-cost ratio was highest (1.85) in pendimethalin treated plots closely followed by fluchloralin treated plots (1.73).

Conclusion

Application of pendimethalin at 0.30 kg a.i./ha as selective pre-emergence herbicide followed by one hand-weeding at 35 DAS can be effective in mustard in minimizing risky proposition relating to phytotoxicity. Similarly fluchloralin at 0.70 kg a.i./ha may also be treated as a safe herbicide for controlling weeds in mustard.

References

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